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EXAMINER	
NGUYEN, KIMBINH T	

ART UNIT	PAPER NUMBER
2628	

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Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 10/03)

Office Action Summary	Application No.	Applicant(s)
	09/901,611	ELBER, GERSHON
	Examiner	Art Unit
	Kimbinh T. Nguyen	2671

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *16 September 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-26 and 28-51* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☒ Claim(s) *25 and 26* is/are allowed.

6)☒ Claim(s) *1-23 and 28-51* is/are rejected.

7)☒ Claim(s) *24* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. This action is responsive to amendment filed 09/16/05.

2. Claims 1-26, 28-51 are pending in the application.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

4. Claim 32 is rejected under 35 U.S.C. 102(e) as being anticipated by Simons et al. (6,320,595).

Claim 32, Simons discloses a method for compressing arbitrary graphical data, comprising analyzing said arbitrary graphical data into constituent geometric parts, where at least some of said constituent geometric parts comprise predetermined shapes and forms (col. 3, lines 29-37 the apparatus that breaks an image into its constituent objects. Objects like circles and polygons are “shapes" and objects like lines and points are “forms"), describing said constituent geometrical parts as procedural description of said constituent geometrical parts of said arbitrary graphical data, where said procedural description comprises a high level functional form representing at least one of said constituent geometrical parts “component object specification," col. 3, lines .30-32), and transmitting said procedural description (col. 3, lines 37-39).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 1-8, 10-1 1, 13-15, 28-29, 31, 46 and 51 are rejected under 35 U.S.C. 103(a) as being unpatentable by Deering (6,525,722) in view of Simons et al. (6,320,595).

Claim 1, Deering, discloses a graphical data-compressor for compression of received, arbitrary graphical data for subsequent transmission (col. 3, lines 37-40 and col. 4, lines 42-46), said graphical data-compressor comprising an input for reception of said received arbitrary graphical data (3D graphics source 10, FIG.4), and a transmitter linked to said functional scene describer for transmission of said analytic description (network interface 110, FIG.4).

However, Deering does not disclose an analyzer linked to said output and operable for analysis of said received arbitrary graphical data into constituent geometrical parts, where at least some of said constituent geometric parts comprise predetermined shapes and forms, and a scene describer, linked to said analyzer for description of said at least some of said constituent geometrical parts as a procedural description of said received arbitrary graphical data, where said procedural description

comprises a high level functional form representing one of said constituent geometrical parts. These elements are disclosed by the Simons graphic image generation and coding method. Simons discloses an analyzer linked to said input and operable for analysis of said received arbitrary graphical data into constituent geometrical parts where at least some of said constituent geometric parts comprise predetermined shapes and forms (col. 3, lines 29-37-the apparatus that breaks an image into its constituent objects. Objects like circles and polygons are "shapes" and objects like lines and points are "forms". Simons also discloses a scene describer, linked to said analyzer for description of at least some of said constituent geometrical parts as a procedural description of said received arbitrary graphical data, where said procedural description comprises a high level functional form representing one of said constituent geometric parts "component object specification", col. 3, lines 30-32). Both the analyzer and the scene describer are part of the encoder 42, FIG. 7.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the Deering geometry compression method in view of the Simons graphic image generation and coding method by replacing the process at step 874, FIG. 5 of Deering with the Simons analyzer process. This would permit the direct transmission of graphic images to hand-held or mobile devices (Simons, col. 3, lines 29-30).

Claim 2, since the applicants on p.12 of the specification defined indexing as a label of an underlying shape and parameters for adapting said underlying shape to reconstruct an original shape, and it is obvious to identify parts of compressed data that

need to be restored at decompression time before compression occurs, Deering must disclose indexing between step 874 and steps 876/878, FIG.5, and these steps occur before transmission (step 884).

Claim 3, Deering discloses arbitrary graphical data in a format selected from a polygonal graphic representation, a point cloud, an ordered piecewise mesh, or (piecewise) polynomial and rational forms and polynomial, rational and freeform functions (ordered piecewise mesh; FIG. 1).

Claim 4, Simons discloses said analyzer for analysis of said graphical data into constituent geometrical parts comprising a pattern matcher matching with a predetermined shape (The "pattern matching" occurs in the sense that the encoding of component object data consists of every object to be drawn having a command word associated with it; see col. 4, lines 31-33. Each command word has a selectable attribute that tells the renderer how it will render that object; see col. 4, lines 62-64. A user seeking to have an object rendered would graphically select that object to be rendered based on a bit in that command word; see col. 4, line 62 to col. 5, line 4.)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the Deering geometry compression method in view of the Simons graphic image generation and coding method by replacing the process at step 874, FIG. 5 of Deering with the Simons analyzer process. This would permit the direct transmission of graphic images to hand-held or mobile devices (Simons, col. 3, lines 29-30).

Claim 5, Deering discloses said constituent geometrical part is a predetermined shape (see rejection of claim 4 above), and said analytic description comprises a functional representation of said predetermined shape "regularly tiled surface portion to be represented as a vertex raster," col. 35, lines 9-11. Note that this functional representation includes both the predetermined shape ("regularly tiled surface portion") and how the predetermined shape will look after it has been compressed ("vertex raster')).

Claim 6, Deering discloses said functional representation (col. 35, lines 9-11) as comprising a basic underlying shape (compressed form of regularly tiled surface portion) together with parameters (connectivity information; col. 35, lines 32-35).

Claim 7, Deering discloses said received arbitrary input data comprising a plurality of data points in space (an ordered piecewise mesh, FIG.1, can reasonably be characterized as a plurality of data points in space).

Claim 8, Deering does not explicitly disclose an applicator for applying a surface fitting function to fit said plurality of data points in space in order to represent said plurality of data points in a format suitable for said analyzer.

However, it would have been obvious to a person skilled in the art at the time the invention was made that such an applicator would exist because, as stated above, the Deering equivalent of the applicant's analyzer decides which parts of the graphical data constitute a regular or irregular surface (874, FIG.5). Deering also sets forth what constitutes a surface (col. 9, lines 41-45). It is therefore obvious that the Deering

equivalent of the applicant's applicator must be the element that applies the Deering rule of what constitutes a surface, and that rule is a surface fitting function.

Claim 10, Deering discloses said predetermined shape as being selected from any one of a group comprising lines, curves, planar freeform surfaces, surfaces of revolution, spherical faces, conical faces, cylindrical faces, torroidal faces, ruled surfaces, extrusion surfaces, sweep surfaces, additive combinations thereof and trimmed combinations thereof (planar freeform surfaces, referred to by Deering as "irregular surfaces," col.10, lines 9-12).

Claim 11, Deering discloses said scene describer operable to select said predetermined shape for said constituent geometrical part by analysis of said constituent geometric part to determine fulfillment of conditions associated with said predetermined shape (Deering decides if the constituent geometrical part (portion of the input arbitrary graphical data) is a regular or irregular surface (predetermined shape) by checking to see if the condition of a regular arrangement of vertices defining the polygons used in the mesh is fulfilled; see col. 9, lines 47-49).

Claims 13 and 41, Deering discloses said procedural description as comprising at least a label of an underlying shape (underlying shape is compressed form of regularly tiled surface portion see col. 35, lines 9-11) and label is vertex extent; see col. 35, lines19-21) and parameters for adapting said underlying shape to reconstruct an original shape (connectivity information in the vertex raster, col. 35, lines 32-35, is used to decompress the compressed data back to its original shape-see step 1948, FIG. 43).

Claim 14, Deering discloses said parameters comprising at least one of a group comprising an orientation, a scale, dimensional parameters and a location (col. 36, lines 24-27).

Claim 15, Deering discloses the label (vertex extent) as an index (col. 35, lines 11-12).

Claim 28, Deering discloses a system for analysis, compression, transmission and decompression of arbitrary graphical data, the system comprising: a graphical data-compressor for compression of received, arbitrary graphical data, said graphical data-compressor comprising: an input for reception of arbitrary graphical data (3D graphics source 10, FIG. 4), a transmitter, linked to said analyzer, for transmission of said analytical description over a data link (network interface 110, FIG.1), said system further comprising a graphical data decompressor for decompression of said functional description into geometric entities, the decompressor comprising: a receiver for reception of said functional description from said data link, and a geometry evaluator for evaluating said functional description in terms of basic geometric shapes, thereby to decompress said compressed graphical data descriptions (network interface 120, FIG.1); and a geometry evaluator, following said receiver, for evaluation of said graphical data in respect of a predetermined set of basic shapes stored at said decompressor (inherent that this would be in the GDU 1910, FIG. 42; see step 1932, FIG. 43 and col. 45, lines 17-26).

However, Deering does not disclose an analyzer linked to said output and operable for analysis of said received arbitrary graphical data into constituent

geometrical parts, where at least some of said constituent geometric parts comprise predetermined shapes and forms, and a scene describer, linked to said analyzer for description of said at least some of said constituent geometrical parts as a functional description of said received arbitrary graphical data, where said functional description comprises a high level functional form representing one of said constituent geometrical parts. These elements are disclosed by the Simons graphic image generation and coding method. Simons discloses an analyzer linked to said input and operable for analysis of said received arbitrary graphical data into constituent geometrical parts where at least some of said constituent geometric parts comprise predetermined shapes and forms (col. 3, lines 29-37-the apparatus that breaks an image into its constituent objects. Objects like circles and polygons are "shapes" and objects like lines and points are "forms"). Simons also discloses a scene describer, linked to said analyzer for description of at least some of said constituent geometrical parts as a functional description of said received arbitrary graphical data, where said functional description comprises a high level functional form representing one of said constituent geometric parts "component object specification," col. 3, lines 30-32).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the Deering geometry compression method in view of the Simons graphic image generation and coding method by replacing the process at step 874, FIG. 5 of Deering with the Simons analyzer process. This would permit the direct transmission of graphic images to hand-held or mobile devices (Simons, col. 3, lines 29-30).

Claim 29, Deering does not explicitly disclose an indexer positioned between said analyzer and said transmitter for indexing said analytic description into an indexed description. However, its existence is at least obvious for the same reason that the scene describer is at least obvious.

It is in fact reasonable to assume that the scene describer and the indexer are two parts of the same structure; the scene describer is a label that identifies a surface as being regular or irregular, and the indexer is the physical position of the label.

Claim 31, Deering discloses said data link selected from a group comprising a LAN, WAN, the Internet, a dedicated land link, a dedicated link through the atmosphere, a radio-wave link, and a microwave link (networks 30, FIG. 4; applicants have listed common networks, and it is apparent by the Deering mention of "networks" that Deering also meant to disclose transmission over common networks).

Claim 46, Deering discloses a graphical data-compressor for compression of received, arbitrary graphical data for subsequent transmission (col. 3, lines 37-40 and col. 4, lines 42-46), said graphical data-compressor comprising an input for reception of said received arbitrary graphical data (3D graphics source 10, FIG. 4), an analyzer linked to said input and operable for analysis of said received arbitrary graphical data into constituent geometrical parts (contained within 3-D graphics compression unit 60, FIG. 4, the Deering equivalent to the analyzer decides which parts of the graphical data constitute a regular or irregular surface; 874, FIG.S. Once the type of surface is determined, it is inherent that the compression method is known; see col.10, lines 1-15), a scene describer, linked to said analyzer for description of at least some of said

constituent geometrical parts as a functional description of said received arbitrary graphical data (not explicitly disclosed, but inherent because once the analyzer decides which parts of the graphical data constitute a regular or irregular surface, there needs to be a way to actually label the surfaces as regular or irregular for the purpose of setting aside different surfaces for different compression methods, namely compressing using the vertex raster format (step 876, FIG. 5) and a geometrical part compressor operatively associated with said scene describer and said analyzer, for reduction of constituent geometric parts not described by said describer, into a reduced quantity of data (3-D graphics compression 60, FIG. 4).

Claim 51, the rationale provided in the rejection of claim 1 is incorporated herein, because Deering also teaches compressing 3D geometry data (col. 3, lines 38-47).

6. Claim 9 is rejected under 35 U.S.C. 103(a) as being unpatentable over Deering in view of Simons and further in view of Krishnamurthy (6,256,038).

Claim 9, Krishnamurthy teaches the surface fitting function is selected from any one of a group comprising Bezier freeform functions, B-spline free functions, NURBS, polynomial functions (col. 11, lines 4-15). It would have been obvious to one of ordinary skill in the art at the time the invention was made to incorporate the fitting technique taught by Krishnamurthy into the mesh compression structure of Deering, because it would provide a useful method for converting dense irregular polygon meshes into surface models suitable for interactive modification and animation (abstract).

7. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Deering in view of Simons and further in view of Go (6,101,277).

Neither Deering nor Simons explicitly discloses the predetermined shape modifiable by trimming. However, this element is disclosed by the Go image encoding and decoding method at col. 17, line 66 to col.18, line 24.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the Deering-Simons geometry compression method in view of the Go image encoding and decoding method by placing the Go reduced image encoder 25 (FIG. 1) in the Deering 3-D graphics compression 60 (FIG. 4). Such a modification would enable edges to be encoded more efficiently (Go, co1.18, 11.19-20).

8. Claims 16-23, 30 and 43-45 are rejected under 35 U.S.C. 5 103(a) as being unpatentable over Deering in view of Simons and further in view of Kono (4,772,947).

Claim 16, Deering discloses a graphics decompressor comprising a receiver for reception of arbitrary graphical data, analyzed into constituent geometrical parts, where at least some of the constituent geometric parts comprise predetermined shapes and forms and described in a functional form (geometry decompression unit ("GDU") 1910, FIG. 42).

However, Deering does not disclose a geometry evaluator, following said receiver, for evaluation of said graphical data, in respect of a predetermined set of basic shapes and forms stored at said decompressor.

These elements are disclosed by Simons (objects like circles and polygons are "shapes" and objects like lines and points are "forms" see col. 3, lines 29-32).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the Deering geometry compression method in view of the Simons graphic image generation and coding method by replacing the process at step 874, FIG. 5 of Deering with the Simons geometry evaluator process. This would permit the direct transmission of graphic images to hand-held or mobile devices (Simons, col. 3, lines 29-30).

However, neither Deering nor Simons disclose a piecewise linear surface approximator following said geometry evaluator for reconstruction of said evaluated data on a piecewise basis, into geometrical entities. This is disclosed by the Kono method and apparatus for transmitting compressed data (col. 2, line 66 to col. 3, line 48, especially col. 3, lines 4-31). 43.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the Deering-Simons geometry compression method in view of the Kono method by inserting the Kono reconstruction unit 15 (FIG.1) in the Simons encoder 42 (FIG.7). Such a modification would allow for smaller compression of each geometrical entity, thereby allowing for more data to be transmitted at a time (Kono, col. 11, lines 1-16).

Claims 17 and 43, Deering discloses said compressed functional form (col. 35, Lines 9- 11) as comprising elements having a basic shape (compressed form of regularly tiled surface portion) associated with parameters (connectivity information; col. 35, lines 32-35). Decompressing a functional description of graphical data is accomplished by GDU 1910, FIG. 42. Evaluating said functional description in terms of

said plurality of basic geometrical shapes is disclosed at col. 45, lines 17-22, especially lines 20-22 (Deering has consistently taught the existence of regular and irregular surfaces see 874, FIG. 5. These are "plurality of basic geometrical shapes."

Furthermore, it would have been obvious to a person skilled in the art at the time the invention was made that evaluation would occur according to more than one shape; otherwise Deering, in explaining step 1932 in a process of decompression (FIG. 43), would not have bothered to bring up the idea of the extent value indicating "the shape of a surface portion" (col. 45, line 22) Finally, col. 48, line 36 states that the flowchart in FIG.43 produces a primitive, which is a "geometric entity").

Claims 18-20, Deering discloses a graphics decompressor wherein said reconstruction into geometrical entities is at a selectable resolution level, and said resolution level is selectable in accordance with a context of the data within a scene, said context being a relationship of the data to a background and a foreground within the scene (col. 49, lines 55-57;col. 43, lines 38-48).

Claims 21-22, Deering does not explicitly disclose said selectable resolution level being determinable by available computer resources, said available computer resources being any one of a group comprising memory availability, processor capability, and available processing time. However, it would be obvious to a person skilled in the art at the time the invention was made that any computer-driven operation would be determinable by the availability of any computer resource, including memory or processor availability or available processing time.

Claim 23, Deering discloses said predetermined shape as being selected from

any one of a group comprising lines, curves, planar perform surfaces, surfaces of revolution, spherical faces, conical faces, cylindrical faces, torroidal faces, ruled surfaces, extension surfaces, sweep surfaces, additive combinations thereof and trimmed combinations thereof (planar freeform surfaces, referred to by Deering as "irregular surfaces," col.10, lines 9-12).

Claims 30 and 44, Kono discloses a piecewise linear surface approximator in a decompressor (col.10, lines 13-46).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the Deering-Simons geometry compression method in view of the Kono method by inserting the Kono reconstruction unit 15 (FIG.1) in the Simons encoder 42 (FIG. 7). Such a modification would allow for smaller compression of each geometrical entity, thereby allowing for more data to be transmitted at a time (Kono, col. 11, lines 1-16).

Claim 45, Kono discloses converting said piecewise linear surface approximation into polygonal geometry (col. 10, lines 13-46), in reconstructing luminance values for each block, Kono aids in reconstructing individual (four-sided) blocks, which are polygons).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the Deering-Simons geometry compression method in view of the Kono method by inserting the Kono reconstruction unit 15 (FIG. 1) in the Simons encoder 42 (FIG.7). Such a modification would allow for

smaller compression of each geometrical entity, thereby allowing for more data to be transmitted at a time (Kono, col. 11, lines 1-16).

Accordingly, in view of the foregoing, claims 16-23, 30 and 43-45 have been rendered unpatentable under 35 U.S.C. 103(a) by Deering, Simons and Kono.

9. Claims 33-39 and 41-42 are rejected under 35 U.S.C. 103(a) as being unpatentable over Simons in view of Deering.

Claim 33, since the applicants defined indexing as a label of an underlying shape and parameters for adapting said underlying shape to reconstruct an original shape, and it is obvious to identify parts of compressed data that need to be restored at decompression time, Simons discloses indexing at col.3, 11.29-37 the apparatus that breaks an image into its constituent objects.

Claim 34, Simons does not disclose arbitrary graphical data in a format selected from a polygonal graphic representation, a point cloud, an ordered piecewise mesh, or (piecewise) polynomial and rational forms and polynomial, rational and freeform functions.

However, Deering discloses these elements (ordered piecewise mesh; FIG.1).

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the Simons encoder 42 (FIG.7) to add the capability of the Deering 3-D graphics compressor 60 (FIG.4). Such a modification would allow for the compression/decompression of both regularly and irregularly tiled surfaces (Deering, col. 3, lines 21-23).

Claims 35 and 38, Simons discloses said analyzer for analysis of said graphical

data into constituent geometrical parts comprising a pattern matcher matching with a predetermined shape (The "pattern matching" occurs in the sense that the encoding of component object data consists of every object to be drawn having a command word associated with it; see col. 4, lines 31-33. Each command word has a selectable attribute that tells the renderer how it will render that object; see col. 4, lines 62-64. A user seeking to have an object rendered would graphically select that object to be rendered based on a bit in that command word; see col. 4, line 62 to col. 5, line 4.)

Claim 36, Simons discloses said constituent geometrical part is a predetermined shape (col. 3, lines 29-37-the apparatus that breaks an image into its constituent objects. Objects like circles and polygons are "shapes", and objects like lines and points are "forms"), and said analytic description comprises a functional representation of said predetermined shape "component object specification", col. 3, lines 30-32).

Claim 37, it is at least obvious that when Simons discloses said received arbitrary input data (image, col. 3, line 31), the arbitrary image data comprises a plurality of data points in space.

Claim 39, Simons discloses said predetermined shape ms being selected from any one of a group comprising lines, curves, planar freeform surfaces, surfaces of revolution, spherical faces, conical faces, cylindrical faces, torroidal faces, ruled surfaces, extrusion surfaces, sweep surfaces, additive combinations thereof and trimmed combinations thereof (lines--col.3, line 32).

Claim 41, Simons discloses said functional description as comprising at least a label of an underlying shape "component object description," col. 3, lines 30-32) and

parameters for adapting said underlying shape to reconstruct an original shape (col. 5, lines 16-36 "underlying shape" is compressed state of image, "original shape" is decompressed image).

Claim 42, Simons discloses encoding further comprising labeling with a label selected from a predetermined index of labels (col. 5, lines 30-32).

Accordingly, in view of the foregoing, claims 33-39 and 41-42 have been rendered unpatentable under 35 U.S.C. 103(a) by Simons and Deering.

10. Claim 40 is rejected under 35 U.S.C. 103(a) as being unpatentable over Simons in view of Deering and further in view of Go (6,101,277).

Neither Simons nor Deering explicitly discloses the predetermined shape modifiable by trimming. However, this element is disclosed by the Go image encoding and decoding method at col.17, line 66 to col.18, line 24.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the Simons-Deering geometry compression method in view of the Go image encoding and decoding method. Such a modification would enable edges to be encoded more efficiently (Go, col.18, lines 19-20).

11. Claims 47-48 are rejected under 35 U.S.C. 103(a) as being unpatentable over Deering in view of Simons and further in view of Lyche et al. "Knot removal for parametric B-spline curves and surfaces" Lyche").

Although Deering discloses a geometrical part compressor, neither Deering nor Simons disclose, with respect to claim 47, a geometrical part expressable as at least

one spline having knots and a knot remover for identifying and removing knots having no effect on reproduction of the part. However, these elements are disclosed, directly or indirectly, by Lyche.

The first paragraph of Section 2, "coefficient norms for B-spline curves and surfaces," on p.218 discloses a parametric B-spline curve with knots. Knot removal is disclosed in the third paragraph of the same section. Item 10 on p.229 states that knot removal can be applied to data compression.

Lyche does not address the issue of reproduction of the geometric part. However, since Deering discloses lossless compression at col. 9, lines 6-8, this element is disclosed as well.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the Deering-Simons geometry compression method in view of the Lyche discussion on knot removal. Such a modification would minimize storage usage by storing polygons with fewer points (Lyche, Item 10, p.229).

Claim 48, Lyche discloses a pattern identifier for identifying patterns of knots (which knots are most significant in representing the spline where the knots reside; see "3. Knot removal for parametric B-spline curves," fourth paragraph, pp.220-221) and an indexer for replacing each identified pattern with an index (weights are used as indexes to indicate the significance of a knot; see "3. Knot removal for parametric B-spline curves," fourth paragraph, pp.220-221).

12. Claim 49 is rejected under 35 USC 103(a) as being unpatentable over Deering in view of Simons and further in view of Demmel, "Applied Numerical Linear Algebra".

Neither Deering nor Simons disclose a least squares approximator reducing said geometrical part into a least squares approximation. However, this is disclosed by the Demmel linear algebra textbook example at pp. 114-117.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the Deering-Simons geometry compression method in view of Demmel's application to a linear algebra theorem to compression. Such a modification would minimize storage usage by permitting storage of many fewer numbers in the compression process (Demmel, p.114 before full paragraph).

Allowable Subject Matter

13. Claim 24 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

14. Claims 25 and 26 are allowed.

Response to Arguments

15. Applicant's arguments filed 11/18/05 have been fully considered but they are not persuasive, because Deering not only teach using 3D geometry data but also teaches graphics data comprises regular and irregular surface structures; a regularly tiles surface portion may specify an arbitrary size and shape (col. 35, lines 9-17).

16. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Kimbinh T. Nguyen whose telephone number is (571) 272-7644. The examiner can normally be reached on Monday to Thursday from 7:00 AM to 4:30 PM. The examiner can also be reached on alternate Friday from 7:00 AM to 3:30 PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ulka Chauhan can be reached at (571) 272-7782. The fax phone number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

February 6, 2006

Kimbinh Nguyen

KIMBINH T. NGUYEN
PRIMARY EXAMINER